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Peter K. Skiff, Esquire
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT PAPER NUMBER

1763

DATE MAILED: 11/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/749,916

Applicant(s)

HUBACEK ET AL. 71

Examiner

Luz L. Alejandro

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-10,21,25,27,30,31 and 33-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-10,21,25,27,30,31 and 33-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/25/04 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-10, 21, 25, 27, 31, 34, and 35 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification, as originally filed, fails to provide support for a silicon electrode having a thickness of about 0.3 inches to 0.5 inches.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 25 recites the limitation "plate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4-10, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Degner et al., U.S. Patent 5,074,456 in view of Murai, JP 2-20018.

Degner et al. shows the invention substantially as claimed including a single crystal silicon showerhead electrode 12 adapted to be mounted in a parallel plate plasma reaction chamber 50 (see figs. 3-4 and table 1) used in substrate processing; the electrode having a thickness in the range from about 0.1 cm to 2 cm and having an RF driven surface on one side thereof (see figs. 3-4) which is exposed to plasma; and a graphite backing ring bonded to the electrode (see col. 5-lines 15-17). For a complete description, see figures 1-4 and their descriptions, specifically col. 1, lines 42-48, col. 2, lines 2-7, col. 4, lines 21-34, col. 5-lines 3-17, col. 5-line 64 to col. 6-line 53.

Degner et al. does not expressly disclose that the electrode is a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm. Murai discloses a low resistivity electrode 2 adapted to be mounted in a parallel plate plasma reaction chamber 5 (see fig. 1) used in substrate processing, the electrode comprising: a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm (see page 86, first column, lines 22-26), the electrode having an RF driven surface on one side thereof (see abstract) which is exposed to plasma. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Degner et al. as to comprise an electrode having an electrical resistivity of less than 0.05 ohm-cm because such electrode structure is known to be suitable to be used in a plasma apparatus.

Concerning the electrode having heavy metal contamination of less than 10 ppm, Degner et al., in col. 3, lines 52-64, discloses that in order to achieve high purity in an electrode the metal contamination should be less than 10 ppm.

Regarding the claimed bonding and clamping structures for securing the electrode to the graphite ring, Degner et al. further discloses that the upper electrode can be secured to backing ring 14 or additional support members 14b, 14c (see fig. 2C) by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler (see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53) or by a clamping member (see col. 8, lines 10-18).

Furthermore, with respect to the showerhead electrode securing structure of claim 10, Degner et al. further discloses a showerhead electrode which is secured to a temperature controlled member in an interior of the plasma reaction chamber, the temperature controlled member including a gas passage for supplying a process gas to the showerhead electrode, a cavity and at least one baffle plate located in the cavity, the gas passage supplying process gas so as to pass through the baffle prior to passing through the showerhead electrode (see col. 7-line 54 to col. 8-line 39, and the figures).

Regarding claim 8 concerning the elastomer being in the form of thin beads, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a prima facie case of obviousness is established with respect to the shape of the elastomer because the shape of the claimed elastomer is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elastomer is significant.

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Claims 3, 21, 25, 27, and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Degner et al., U.S. Patent 5,074,456 in view of Murai, JP 2-20018 as applied to claims 1, 4-10, and 30, above, and further in view of Saito et al., U.S. Patent 5,993,597.

Degner et al. and Murai are applied as above but do not expressly disclose the claimed diameter of the gas outlets. Saito et al. shows a parallel plate plasma apparatus having an electrode comprising a plurality of bores having diameters of 0.5 mm, 0.020 inch, (see col. 3, lines 15-17, 56-57, and 65-66; col. 5, lines 1-3; and col. 6, lines 14-15). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the electrode's gas outlets of the apparatus of Degner et al. modified by Murai of the claimed diameter because such a dimension is suitable for gas outlets of a showerhead electrode. Furthermore, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device, In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

With respect to the outlets of the electrodes comprising ultrasonically drilled holes (claim 27), this represents a process limitation which is not given patentable weight in a claim directed to a product.

Regarding claim 31 concerning the elastomer being in the form of thin beads, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a prima facie case of obviousness is established with respect to the shape of the elastomer because the shape of the claimed elastomer is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elastomer is significant.

Claims 1, 4-10, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murai, JP 2-20018 in view of Degner et al., U.S. Patent 5,074,456.

Murai shows the invention substantially as claimed including a low resistivity electrode 2 adapted to be mounted in a parallel plate plasma reaction chamber 5 (see fig. 1) used in substrate processing, the electrode comprising: a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm (see page 86, first column, lines 22-26), the electrode having an RF driven surface on one side thereof (see abstract) which is exposed to plasma.

Murai fails to expressly disclose the claimed electrode structure having a thickness of about 0.3 to 0.5 inches and being elastomer bonded to a graphite backing ring, and the silicon electrode being a showerhead. Degner et al. shows a parallel plate electrode apparatus in which the upper electrode is used as a showerhead, has a

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thickness in the range from about 0.1 cm to 2 cm, and is bonded to a graphite backing ring (see figures 1-4 and their descriptions, specifically col. 1, lines 42-48, col. 2, lines 2-7, and col. 4, lines 21-34). Therefore, in view of these disclosures it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Murai as to comprise a showerhead electrode having the claimed thickness and support structure because in such a way a uniform plasma is generated since the gases flow downward, the thickness can be optimized based upon a variety of factors such as the cost of the material, the electrode can be adequately supported, and overlapping ranges between the claims and the reference establish a case of prima facie obviousness see MPEP 2144.05.

Furthermore, Murai does not expressly disclose that the electrode has heavy metal contamination of less than 10 ppm. Degner et al. (col. 3, lines 52-64) disclose that in order to achieve high purity in an electrode the metal contamination should be less than 10 ppm. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of the Murai reference as to comprise an electrode having a metal contamination of less than 10 ppm because this will lead to an electrode having high purity.

Also, Murai does not expressly disclose the claimed bonding and clamping structures for securing the electrode to a support member and a graphite ring bonded to the electrode. Degner et al. further discloses that the upper electrode can be secured to, for example, a graphite backing ring support 14 and additional support members

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14b, 14c (see fig. 2C) by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler (see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53 and fig. 2C) or by a clamping member (see col. 8, lines 10-18). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus disclosed by Murai as to: 1) bond the electrode to the support member and graphite ring as claimed because, for example, the likelihood of breakage of the electrode or debonding from the support member is reduced as is the distortion, and the thermal contact is improved or alternatively 2) as to use a clamping member because such structures are suitable and known for mechanically securing the electrode to the support member.

Furthermore, Murai fails to expressly disclose the showerhead electrode securing structure of claim 10. Degner et al. further discloses a showerhead electrode which is secured to a temperature controlled member in an interior of the plasma reaction chamber, the temperature controlled member including a gas passage for supplying a process gas to the showerhead electrode, a cavity and at least one baffle plate located in the cavity, the gas passage supplying process gas so as to pass through the baffle prior to passing through the showerhead electrode (see col. 7-line 54 to col. 8-line 39, and the figures). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the showerhead electrode of the apparatus disclosed by Murai as to be bonded to a temperature controlled member as claimed because in such a way uniform distribution of the

processing gases is achieved and the temperature of the electrode can be better controlled.

Murai fail to expressly disclose the backing ring being made of graphite. Degner et al. discloses a backing ring which can be made of graphite (see col. 5-lines 15-17). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electrode of Murai to include a backing ring constructed of, for example, aluminum or graphite, because this will allow for the backing plate to be readily machinable.

Regarding claim 8 concerning the elastomer being in the form of thin beads, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a prima facie case of obviousness is established with respect to the shape of the elastomer because the shape of the claimed elastomer is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elastomer is significant.

Claims 3, 21, 25, 27, and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murai, JP 2-20018 in view of Degner et al., U.S. Patent 5,074,456 as applied to claims 1, 4-10, and 30 above, and further in view of Saito et al., U.S. Patent 5,993,597.

Murai and Degner et al. are applied as above but do not expressly disclose the claimed diameter of the gas outlets. Saito et al. shows a parallel plate plasma apparatus having an electrode comprising a plurality of bores having diameters of 0.5

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mm, 0.020 inch, (see col. 3, lines 15-17, 56-57, and 65-66; col. 5, lines 1-3; and col. 6, lines 14-15). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the electrode's gas outlets of the apparatus of Murai modified by Degner et al. of the claimed diameter because such a dimension is suitable for gas outlets of a showerhead electrode.

Furthermore, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device, In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

With respect to the outlets of the electrodes comprising ultrasonically drilled holes (claim 27), this represents a process limitation which is not given patentable weight in a claim directed to a product.

Regarding claim 31 concerning the elastomer being in the form of thin beads, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a prima facie case of obviousness is established with respect to the shape of the elastomer because the shape of the claimed elastomer is a matter of choice which a

person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elastomer is significant.

Claims 1, 3-10, 21, 25, 27, 30-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al., U.S. Patent 5,993,59 in view of Degner et al., U.S. Patent 5,074,456.

Saito et al. shows the invention substantially as claimed including a low resistivity electrode adapted to be mounted in a parallel plate plasma reaction chamber used in semiconductor substrate processing (see col. 1, lines 6-8), the electrode comprising: a single crystal silicon electrode having an electrical resistivity of 0.0001 ohm-cm (see abstract; col. 1, lines 64-65; col. 3, lines 65-67; examples 6-11 of Table 1; col. 4-line 65 to col. 5-line 5; col. 6, lines 10-15; and examples 4 and 7 of Table 2). Since the electrode is used in a parallel plate reactor, it is inherent that the electrode has a surface which is grounded or is coupled to RF power, the surface being exposed to plasma. Furthermore, the electrode comprises a plurality of bores having diameters of 0.5 mm, 0.020 inch, (see col. 3, lines 15-17, 56-57, and 65-66; col. 5, lines 1-3; and col. 6, lines 14-15). It is inherent, in view of this disclosure, that the electrode is being used as a showerhead electrode.

Saito et al. fails to expressly disclose the electrode having a thickness of about 0.3 to 0.5 inches, and the silicon electrode being a showerhead. Degner et al. shows a parallel plate electrode apparatus in which the upper electrode is used as a showerhead and which can have a thickness in the range from about 0.1 cm to 2 cm (see figures 1-4

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and their descriptions, specifically col. 1, lines 42-48, col. 2, lines 2-7, and col. 4, lines 21-34). Therefore, in view of these disclosures it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Saito et al. as to comprise a showerhead electrode having the claimed thickness because in such a way a uniform plasma is generated since the gases flow downward, the thickness can be optimized based upon a variety of factors such as the cost of the material, and overlapping ranges between the claims and the reference establish a case of prima facie obviousness see MPEP 2144.05.

With respect to claim 4, Saito et al. does not expressly disclose that the electrode has heavy metal contamination of less than 10 ppm. Degner et al. (col. 3, lines 52-64) disclose that in order to achieve high purity in an electrode the metal contamination should be less than 10 ppm. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of the Saito et al. reference as to comprise an electrode having a metal contamination of less than 10 ppm because this will lead to an electrode having high purity.

Saito et al. is applied as above but lacks anticipation of disclosing the claimed bonding and clamping structures for securing the electrode to a support member. Degner et al. further discloses that the upper electrode can be secured to, for example, a graphite backing ring support and additional support members by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler

(see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53 and fig. 2C) or by a clamping member (see col. 8, lines 10-18). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus disclosed by Murai as to: 1) bond the electrode to the support member and graphite ring as claimed because, for example, the likelihood of breakage of the electrode or debonding from the support member is reduced as is the distortion, and the thermal contact is improved or alternatively 2) as to use a clamping member because such structures are suitable and known for mechanically securing the electrode to the support member.

Also, Saito et al. fails to expressly disclose the showerhead electrode securing structure of claim 10 and a backing ring elastomer bonded to the electrode as claimed in claim 21. Degner et al. discloses a parallel plate plasma reactor in which a showerhead electrode is secured to a temperature controlled member in an interior of the plasma reaction chamber, the temperature controlled member including a gas passage for supplying a process gas to the showerhead electrode, a cavity and at least one baffle plate located in the cavity, the gas passage supplying process gas so as to pass through the baffle prior to passing through the showerhead electrode (see col. 7-line 54 to col. 8-line 39, and the figures of Degner et al.). In view of these disclosures, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the showerhead electrode of the apparatus disclosed by Saito et al. as to be bonded to a temperature controlled member as claimed because in such a way

uniform distribution of the processing gases is achieved and the temperature of the electrode can be better controlled.

Furthermore, Saito et al. fails to expressly disclose the backing ring being made of graphite. Degner et al. discloses a backing ring which can be made of graphite (see col. 5-lines 15-17). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electrode of Saito et al. to include a backing ring constructed of, for example, aluminum or graphite, because this will allow for the backing plate to be readily machinable.

With respect to the outlets of the electrodes comprising ultrasonically drilled holes (claim 27), this represents a process limitation which is not given patentable weight in a claim directed to a product.

Regarding claims 34-36, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device, In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding claims 8 and 31 and the elastomer being in the form of thin beads, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a prima facie case of obviousness is established with respect to the shape of the elastomer because the shape of the claimed elastomer is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elastomer is significant.

Claims 1, 3-10, 21, 25, 27, 30-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Degner et al., U.S. Patent 5,074,456 in view of Saito et al., U.S. Patent 5,993,597.

Degner et al. shows the invention substantially as claimed including a single crystal silicon showerhead electrode 12 adapted to be mounted in a parallel plate plasma reaction chamber 50 (see figs. 3-4 and table 1) used in substrate processing; the electrode having a thickness in the range from about 0.1 cm to 2 cm and having an RF driven surface on one side thereof (see figs. 3-4) which is exposed to plasma; and a graphite backing ring elastomer bonded to the electrode. For a complete description, see figures 1-4 and their descriptions, specifically col. 1, lines 42-48, col. 2, lines 2-7, col. 4, lines 21-34, col. 5-lines 3-17, and col. 5-line 64 to col. 6-line 53.

Degner et al. does not expressly disclose that the electrode is a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm. Saito et al. discloses a low resistivity electrode adapted to be mounted in a parallel plate plasma reaction chamber used in semiconductor substrate processing (see col. 1, lines 6-8),

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the electrode comprising: a single crystal silicon electrode having an electrical resistivity of 0.0001 ohm-cm (see abstract; col. 1, lines 64-65; col. 3, lines 65-67; examples 6-11 of Table 1; col. 4-line 65 to col. 5-line 5; col. 6, lines 10-15; and examples 4 and 7 of Table 2). Since the electrode is used in a parallel plate reactor, it is inherent that the electrode has a surface which is grounded or is coupled to RF power, the surface being exposed to plasma. Furthermore, the electrode comprises a plurality of bores having diameters of 0.5 mm, 0.020 inch, (see col. 3, lines 15-17, 56-57, and 65-66; col. 5, lines 1-3; and col. 6, lines 14-15). It is inherent, in view of this disclosure, that the electrode is being used as a showerhead electrode. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Degner et al. as to comprise an electrode having an electrical resistivity of less than 0.05 ohm-cm and a plurality of bores having diameters of 0.5 mm, 0.020 inch, because such electrode structure is known to be suitable to be used in a plasma apparatus. Concerning claims 34-36, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device, In *Gardner v.*

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TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Concerning the electrode having heavy metal contamination of less than 10 ppm, Degner et al., in col. 3, lines 52-64, discloses that in order to achieve high purity in an electrode the metal contamination should be less than 10 ppm.

Regarding the claimed bonding and clamping structures for securing the electrode to a graphite ring and a support member, Degner et al. further discloses that the upper electrode can be secured to a graphite ring 14 or additional support members 14b, 14c (see fig. 2C) by either a bonding member comprising a joint having an electrically conductive material between the electrode and the support member and which includes an electrically conductive filler (see col. 5, lines 3-17, col. 5-line 64 to col. 6-line 53) or by a clamping member (see col. 8, lines 10-18).

Furthermore, with respect to the showerhead electrode securing structure of claim 10, Degner et al. further discloses a showerhead electrode which is secured to a temperature controlled member in an interior of the plasma reaction chamber, the temperature controlled member including a gas passage for supplying a process gas to the showerhead electrode, a cavity and at least one baffle plate located in the cavity, the gas passage supplying process gas so as to pass through the baffle prior to passing through the showerhead electrode (see col. 7-line 54 to col. 8-line 39, and the figures).

With respect to the outlets of the electrodes comprising ultrasonically drilled holes (claim 27), this represents a process limitation which is not given patentable weight in a claim directed to a product.

Regarding claims 8 and 31 and the elastomer being in the form of thin beads, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a prima facie case of obviousness is established with respect to the shape of the elastomer because the shape of the claimed elastomer is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elastomer is significant.

Response to Arguments

Applicant's arguments filed 10/25/04 have been fully considered but they are not persuasive.

With respect to independent claims 1 and 21 including the limitation of the electrode having a thickness of about 0.3 inches to 0.5 inches, such limitation raises the issue of new matter because support only exists in the specification for as low as 0.375 inches, and it is not appropriate to round off 0.375 inches to 0.3 inches in the claim. While the application states making the electrode thicker than a conventional electrode it only states making the electrode with an increased thickness of 0.375-0.5 inches. No support is provided for a thickness between 0.25-0.375 or greater than 0.5 inches. Since it is clear that the range of 0.375-0.5 inches is greater than a conventional 0.25 inches electrode, the examiner contends that if it was desired to claim any other range besides 0.375-0.5 inches then it would have been stated in the specification.

Furthermore, in response to the cited case law by applicant, the examiner acknowledges that incorporation by reference is permitted in some cases, however, -

mere reference to another application, patent or publication is not an incorporation by reference for the purpose of disclosure required by 35 U.S.C. 112, first paragraph. In addition to other requirements for an application, the reference in the application should include an identification of the reference patent as well as specific portion of the referenced document where the subject matter being incorporated may be found.

Applicant contends that Degner et al. provides support under 35 USC 112, first paragraph, for the claimed electrode thicknesses since such reference was incorporated by reference in the specification of the instant application. However, "To incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents." *Id.* at 1282, 54 USPQ2d at 1679, citing *In re Seversky*, 474 F.2d 671, 674, 177 USPQ 144, 146 (CCPA 1973), and *In re Sanders*, 444 F.2d 599, 602-603, 170 USPQ 213, 216-17 (CCPA 1971). Since the specification, as originally filed, fails to identify with detailed particularity that the electrode thickness is being incorporated by reference from the Degner et al. reference (note from page 6, lines 26-29 of the instant application only specific mention of incorporating metallurgical or adhesive bonding of an electrode to a support from the Degner et al. reference), the instant application fails to provide support under 35 USC 112, first paragraph, for the claims rejected under 35 USC 112, first paragraph, in the rejection detailed above. Furthermore, as evidenced by Degner et al., U.S. Patent 5,074,456, conventional electrode thicknesses usually range from 0.039 to 0.787 inches, which clearly includes the recited conventional and claimed electrode thickness ranges, and therefore, it

appears to be improper to rely on specific portions of a wide range of values from a referenced patent in order to overcome an incomplete original filed application as required by 35 U.S.C. 112, first paragraph.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). For example, with respect to the rejection of Degner et al. in view of Murai, applicant states that the thickness of the electrode is not shown by Murai. However, it should be noted that Murai has not been relied upon to show the thickness of the electrode, instead Degner et al. has been relied upon to show such limitation. Furthermore, with respect to this and all of the rejections, the examiner submits that the thickness has been adequately addressed in the rejections stated above.

With respect to the Hubacek declaration, as stated in the previous office action, the fact that a thicker electrode results in a decreased center to edge temperature gradient and reduced cracking is an expected result rather than an unexpected result. One would expect that a thicker electrode would be harder to crack and have a lower temperature gradient since it is thicker. Furthermore, the examiner provided the Uwai et al. reference in order to support the position that the results are expected and not unexpected since the Uwai et al. reference provides support for showing that thicker electrodes have a high heat capacity or smaller temperature gradient (see particularly, col. 4, lines 27-36 of the Uwai et al. reference). However, applicant argues the specific

structure of the electrode shown in Uwai et al.. It should be noted that this reference was cited for the general teaching that a thicker electrode (regardless of the material) will have a smaller temperature gradient and will last longer. Such a general teaching is clearly shown in the Uwai reference at the cited portions.

Furthermore, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Additionally, as stated in the last office action and concerning statements 5 and 6 in the declaration, such statements are largely unsupported statements which are not backed up by supplementary evidence and therefore these statements are insufficient to establish unexpected results.

Regarding the 35 U.S.C. 103 rejection of Degner in view of Murai and further in view of Saito, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that the Murai reference is not combinable with Degner, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would

have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Furthermore, as stated previously, the rejection under 35 USC 103(a) over Murai in view of Degner et al., is still believed proper because Degner et al. does not change the principle of operation of Murai since modifying Murai with Degner et al. will still allow for Murai to be used as an electrode consistent with the teachings of Murai.

Additionally, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Furthermore, in response to applicant's argument that there is no suggestion to combine the Degner et al. and/or Murai references with the Saito reference, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Saito discloses suitable dimensions for gas outlets of a showerhead electrode.

In response to applicant's arguments with respect to the rejections under 35 U.S.C. 103 of Saito in view of Degner and Degner in view of Saito, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Furthermore, in response to applicant's argument that there is no suggestion to combine the Saito and Degner references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the Saito and Degner references is clearly stated in the above and previous rejections.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Luz L. Alejandro
Primary Examiner
Art Unit 1763

November 13, 2004